

### Remarks

The Examiner's reconsideration of the application is urged in view of the various amendments above, attachment hereto, and comments which follow.

#### I.

Claims 1-3, 10, 12, 14, 15, 17 and 20 have been amended so as to overcome the objections raised by the Examiner.

Claims 4 to 9, 11, 13, 16, 18 and 19 have not been changed.

#### II. Priority

With regard to the filing of a certified copy of the priority application, this has been carried out on 2 September 2005.

Contrary to the statement of the Examiner, the claim for priority under 35 U.S.C. 119(a)-(d) is valid because the end of the priority year, i.e. 21 March 2004, was a Sunday. According to 35 U.S.C. 21(b), when the day, or the last day, for taking any action in the United States Patent and Trademark Office falls on a Saturday, Sunday, or Federal holiday within the District of Columbia, the action may be taken on the next succeeding secular or business day. In the present case this was Monday 22 March 2004. Therefore, priority has been validly claimed.

#### III. Specification

##### 1. Abstract

In accordance with the objections raised by the Examiner regarding the abstract, the abstract has been replaced.

##### 2. Specification

The specification has been amended by:

placing a period (.) at the end of the sentence on page 8 line 32.

placing a period (.) at the end of the sentence on page 16 line 15.

The specification has furthermore been amended above in accordance with the amendments in claims 1-3, 10, 12, 14, 15 and 20 (see below). The wording 'energise' along with any form of it has been changed into 'energize' along with any form of it.

#### IV. Claim objections

Claims 1-3, 10, 12, 14, 15 and 20 have been amended by changing "energisable", "non-energised" and/or "energising" into resp. "energizable", "non-energized" and "energizing".

Claim 14 has been amended so as to change "the voltage" into "a voltage", as previously there was no antecedent basis for "the voltage".

Claim 17 has been amended by changing "means for sensing" into "the means for sensing".

#### V. Claim rejections – 35 U.S.C. §112

The wording "the first respectively second motor stator winding" and "the second respectively first motor stator winding" in claims 2 and 14 has been used to indicate that sensing the voltage on the first motor stator winding is carried out during energizing of the second motor stator winding and that sensing the voltage on the second motor stator winding is carried out during energizing of the first motor stator winding, as is described in the application as filed on page 12 lines 1 to 8.

In the applicants' opinion, claims 2 and 14 clearly claim the subject matter as described in the description of the application and therefore need not be amended. Nevertheless, if the Examiner disagrees and requires that claims 2 and 14 be revised, then claim 2 can be changed as follows:

*"2. A method according to claim 1, wherein the sensing of the voltage on the first motor stator winding is carried out during energizing of the second motor stator winding, and wherein the sensing of the voltage on the second motor stator winding is carried out during energizing of the first motor stator winding. "*

and claim 14 can be changed as follows:

*"14. An apparatus according to claim 12, wherein the means for sequentially and alternately sensing has means for sensing of a voltage on the first motor stator winding during energizing of the second motor stator winding, and means for sensing of a voltage on the second motor stator winding during energizing of the first motor stator winding. "*

These changes have not been made, however, as explained above because the claims are clear.

#### VI. Claim rejections – 35 U.S.C. §102

Claims 1 to 20 of the application as filed have been rejected by the Examiner because the subject matter of claim 1 allegedly is anticipated by Fincher in US 4,851,755. However, the applicants do not agree with this rejection for the following reasons.

US 4,851,755 relates to a motor drive system comprising a pulse detector/discriminator 32 (see Fig. 3) that indicates whether the motor 10 is in running condition.

When the detector 32 determines that the motor 10 is in a proper running condition, it applies an output signal of a first logic level via line 33 to an up-down current ramper 34. On the other hand, when circuit 32 determines that the induced pulse is incorrect, it assumes that the rotor has stalled, and applies via line 33 output signal of a second logic level to the up/down current ramper 34. In response to the signal on line 33 the ramper provides a decreasing or increasing ramp signal on line 36 to a power command adjustment circuit 38. (Col.5 1.45-55)

In Col.5 lines 14 to 35 it is described that the **deenergized phase** is utilized to determine whether the rotor has actually stepped after a drive pulse has been applied. By motion of the rotor a **voltage pulse is induced in the deenergized stator winding** due to back electromagnetic force (EMF). The pulse detector/ discriminator determines whether the induced pulse corresponds to a pulse induced by actual rotor movement corresponding to one step.

In US 4,851,755 the deenergized phase is thus used to determine the movement of the rotor. However, in the present invention and as mentioned in claims 1 and 12, the voltage is sensed not only during a non-energized state, but more precisely **at or near the end of a period of a non-**

**energized state.** This is not disclosed in US 4,851,755. Therefore, claim 1 is not anticipated by US 4,851,755.

Sensing or sampling at or near the end of the non-energized or substantially current-less state of the coil is extremely advantageous for fast moving rotors in combination with high coil-currents, as that way measurement is done when the current in the coil is as small as possible.

US 4,851,755 does not hint in the direction of sensing the voltage when the current in the coil is as small as possible and thus does not hint in the direction of sensing the voltage at or near the end of a period of the non-energized state. Therefore, claim 1 as presently on file is non-obvious in view of US 4,851,755.

None of the other cited prior art references (US 4,422,040 – US 5,376,866 – US 6,586,898) disclose nor hint in the direction of sensing the voltage at or near the end of a period of the non-energized state, when the current in the coil is as small as possible. Therefore, claim 1 as presently on file is novel over and not obvious in view of the other cited prior art references, as well.

Because of the above discussion, the applicants believe that claim 1 as presently on file is allowable over the cited prior art references and does not need to be amended.

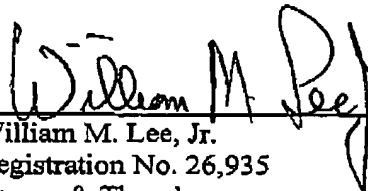
For the same reasons as set out above for claim 1, claim 12 is allowable over the cited prior art references.

In virtue of their dependency of claim 1 or claim 12, claims 2 to 11 and claims 13 to 20 are allowable over the cited prior art references and hence do not need to be substantively amended.

In view of the foregoing, it is submitted that the application meets all requirements of 35 U.S.C. and is in condition for allowance. The Examiner's further and favorable reconsideration of the application is therefore urged.

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Respectfully submitted,

  
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## ABSTRACT

**Device and method for detecting rotor speed of a multiple  
phase motor with bipolar drive**

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A method for detecting rotation of a rotor of a multiple phase motor with bipolar drive is described, excluding a three-phase motor with bipolar drive with star connected coils or motor stator windings. The motor has at least a first and a second energisable motor stator winding. A voltage is sequentially and alternately sensed on the first and the second motor stator winding at or near the end of a period of a non-energised state thereof. An apparatus for detecting rotor speed is also provided.

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